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contributions to the progress of American geology. Indeed, his description of the new red sandstone flora of North Carolina is so valuable, that the U. S. geological survey has recently reproduced the descriptions and all the plates given by Emmons in the sixth part of his 'American geology.'

Although educated in accordance with the Puritan discipline of the old New-England pattern, Professor Emmons was of a cheerful and most amiable disposition, and was respected and beloved by all who came in contact with him. I cannot better finish this too short notice of one of the greatest pioneers of American geology, than by quoting the opinion of one who was acquainted with him during his whole life, the respected and beloved Rev. Mark Hopkins, long president of Williams college, who says, "Emmons was a man of remarkable powers and great accuracy of observation. He seemed to have an intuitive perception of the differences in natural objects. He possessed an intense enthusiasm in his work, but in his manner was remarkably quiet. I have never seen the two things combined to the same extent. His perseverance knew no limit. It ought to be added, that, in connection with his science, he was deeply religious. Williams college is greatly indebted to him for its collections in natural history."

JULES MARCOU.

#### THE ROYAL SOCIETY OF CANADA.

THE fourth annual meeting of the Royal society of Canada took place last week in Ottawa. The proceedings extended over four days, beginning on Tuesday the 26th; and the attendance of members and delegates was, on the whole, very satisfactory, though not quite equal in number to that at the last meeting. Of fellows, about forty were registered, while thirteen affiliated societies were represented by delegates.

Tuesday was entirely devoted to the general meeting of the society, the morning being occupied by formal business and the reception of reports from delegates and committees; the afternoon, by the addresses of the president, Dr. T. Sterry Hunt, Vice-Presidents Dr. D.

Wilson and Hon. P. J. Chauveau, and his excellency the marquis of Lansdowne as honorary president. Dr. Hunt, in the course of his address, took occasion to urge strongly the utility of the establishment of accurate tidal observations on the coasts of the Dominion, while the vice-president, in reviewing the work of the society, pointed out the special necessity of immediate effort in connection with ethnological research.

The society is divided into four sections, — two dealing with French and English literature, history, and allied subjects, respectively; one with mathematical, physical, and chemical sciences; and one with geological and biological subjects. Over thirty papers, in all, were presented; the meetings of sections going on simultaneously, and occupying the greater part of the time on Wednesday and Thursday. The papers of a purely literary or historical character scarcely fall within the province of this journal. The following notes embrace merely the salient points of some of the more important or novel scientific communications: —

In a paper on the mesozoic floras of a portion of the Rocky Mountain region north of the 49th parallel, Sir William Dawson referred specially to a remarkable Jurasso-cretaceous flora recently discovered, which occupies a stage much lower than the Dakota beds, and gives evidence of a great basin of lower cretaceous rocks in that part of the north-west. The paper was illustrated by a suite of specimens. A second paper by the same author related to certain new points in the geology of Prince Edward Island, and the correlation of the rocks of the island with the Permo-carboniferous, Permian, and triassic, as proposed by Mr. Bain. Mr. G. F. Matthew contributed a third part of his investigation of the Cambrian fauna of the vicinity of St. John, N.B., indicating the division of the Cambrian into several subordinate series, the relations of which, with their European and other equivalents, were discussed. In the Rev. Dr. Honeyman's essay on the geology of M'Nab's Island, Halifax, a point which gave rise to some discussion in the section was the described occurrence of glacially transported fragments of trap rocks like those of the Bay of Fundy. These must have been carried across the entire width of the peninsula of Nova Scotia. Prof. E. J. Chapman gave the results of a close examination of the Wallbridge hematite deposit in Ontario, which he considered as typical of a large class of ore-deposits in that region, and proved to be an irregular mass or 'stock-work' penetrat-

ing the Laurentian strata. Mr. Thomas Macfarlane brought two communications before the society, but read them in abstract only. That on the much-disputed region in the south-eastern part of Quebec pointed out certain critical localities in regard to which additional investigation was desirable. Papers by Prof. Loring W. Bailey and Mr. William Saunders on the economic minerals of New Brunswick, and butterflies of Canada, respectively, being catalogues, were merely explained in general terms. Dr. G. M. Dawson described the Cambrian rocks met with by him in the Rocky Mountains north of the international line, and compared these with those of Nevada and the Colorado Cañon. Professor Ramsey Wright's note on the genus *Hypophthalmus*, was, in the absence of the author, read by title only.

In the physical and chemical section Dr. T. Sterry Hunt gave an exposition of his proposed new classification of silicates, dividing these minerals into three great groups. A second paper by the same author was on the geognosy of crystalline rocks. These are first considered, in relation to condition, as stratified or unstratified, and an endeavor made to define the limits of stratiform structure due to bedding and the flow of molten matter. A further development is then given of the crenitic theory. The author claims that the whole subject belongs essentially to chemistry and mineralogy, and that the speculations of geologists have rather obscured than elucidated, the problems presented by the crystalline series. In continuation of a previous investigation, a paper was read by Prof. E. Haanel, describing certain blowpipe reactions on plaster-of-Paris tablets. These included a mode of detection of osmium with hydriodic acid, and of chromium, antimony, and molybdenum with terchloride of tin. Dr. H. A. Bayne outlined the results of a series of critical experiments on the best modes of determining analytically the amount of silk present in mixed fabrics. He recommended the employment of basic zinc chloride as a solvent for silk in the presence of wool, and of Lowe's alkaline glycerine solution of oxide of copper when silk is combined with cotton and linen fibres. Dr. A. Johnson read an elaborate paper on the best and most economical methods of establishing tidal observatories and investigating tidal currents, dealing particularly with the Gulf of St. Lawrence and eastern coast of Canada. Mr. C. Carpmal brought before the section a paper on the determination, in terms of a definite integral, of the value of the expression

$$\frac{1}{m+n} \left\{ \left( x + \frac{n}{2} \right)^{m+n} - n \left( x + \frac{n}{2} - 1 \right)^{m+n} + \dots \right. \\ \left. + (-1)^r \frac{\lfloor n \rfloor}{n-r} \left( x + \frac{n}{2} - r \right)^{m+n} + \dots \right. \\ \left. + (-1)^n \left( x - \frac{n}{2} \right)^{m+n} \right\},$$

the series to be continued only as long as the quantity raised to power  $m+n$  is positive,  $n$  being a positive integer, and  $m$  a positive integer, zero, or a negative integer numerically less than  $n$ ; and on the deduction therefrom of approximate values in certain cases. After pointing out that Cauchy's investigation fails when  $m$  is zero or a positive integer, although Cauchy had assumed without comment that it would hold, the author proceeds to investigate the values of certain 'extraordinary integrals.' The values obtained differ in most cases from those of Cauchy; but the final approximate values agree with them, if we correct certain numerical errors in his results.

In this section the following papers were also read: "On the introduction and rational interpretation of negative and imaginary quantities in the calculus," by Dr. D. Duval; "Note on the quantitative blowpipe assay of cinabar," by Professor Haanel; "On the theory of M. Steckel," by Mr. C. Baillargé; "On some iron ores of Ontario," by Professor Chapman; "A commentary on section ix. of Newton's 'Principia,'" by Professor Cherriman; "The density of weak aqueous solutions of salts," by Professor McGregor; "On longitude determinations at Montreal," by Prof. W. A. Rogers and H. McLeod; "On Clausius' theory of the virial," by Professor Loudon.

Two important ethnological papers were read by Dr. D. Wilson in the section of English literature. The first, "On the manifestation of the aesthetic faculty in primitive races," discussed the evidence of this faculty, and the practice of imitative art among uncivilized peoples. The neolithic period in Europe showed an almost entire absence of such art; but, in the vastly more remote age of the cave-men of France, remarkable indications of it occur. The author compared these with evidences of the art of American aborigines, and stated his reasons for tracing all alike to efforts at sign-language, and ideographic expressions of facts and thought. Dr. Wilson's second communication pointed out, that, in the drawings of the cave-men of France, right-hand profiles are to those of the left-hand as about two to one. The proportion of left-hand drawings is greatly

in excess of what would now be found; but there is still a distinct preponderance of the right-hand, which, however originated, has sufficed to determine the universal dexterity of the whole historic period.

In the French literary section, Abbé Tanguay read a statistical paper on the French population of Canada from 1608 to 1631.

At the closing general meeting on the 29th, the election of several new ordinary members was confirmed, and Prof. T. G. Bonney was elected as a corresponding member. Dr. D. Wilson and Rev. T. E. Hamel were elected as president and vice-president for the next meeting.

#### *PREVENTING COLLISIONS WITH ICEBERGS IN A FOG.*

THE recent accident to the steamer *City of Berlin* emphasizes the importance of devising practical methods of ascertaining the proximity of icebergs in a fog. The precautions adopted by Capt. Laud, though they saved the lives of more than fourteen hundred passengers, and prevented serious damage to the vessel, did not prevent contact with the berg. Even the 'look-outs' were unaware of the proximity of the iceberg until it was actually upon them.

Under these circumstances, the method proposed by Mr. Frank Della Torre of Baltimore deserves consideration. His experiments indicate the possibility of obtaining an echo from an iceberg when in dangerous proximity to a ship. Mr. Della Torre believes that even an object offering so small a surface as a floating wreck may in this way be detected during a fog in time to prevent collision. However this may be, it is certain that his method is worthy of a careful trial at sea, and that preliminary experiments, recently made in the presence of Professor Rowland of Johns Hopkins university and the present writer, have demonstrated the feasibility of producing well-marked echoes from sailing-vessels and steamboats at considerable distances away.

These experiments were made on the River Patapsco, near the head of Chesapeake Bay, at a point about seven miles from the city of

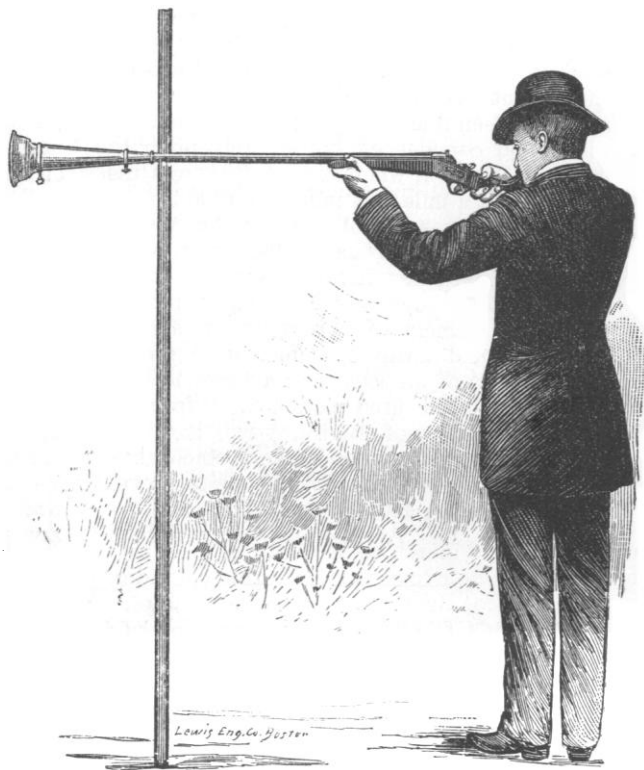
Baltimore. The party proceeded down the river in a steam-launch to the selected place, where the distance from shore to shore appeared to be about three miles.

The launch was kept so far from land as to prevent the possibility of mistaking an echo from the shore for one produced by a passing vessel.

The apparatus employed consisted of a musket to the muzzle of which a speaking-trumpet had been attached (see the illustration). This gun was aimed at passing vessels, while blank cartridges were fired. After a longer or shorter time, according to the distance of the vessel, an echo was returned.

The ordinary river-steamboats, and schooners with large sails, returned perfectly distinct echoes, even when apparently about a mile distant. At shorter distances the effects were, of course, still more striking.

In order to test the effects under the most disadvantageous circumstances, blank car-



tridges were fired in the direction of an approaching tugboat. The surface presented was, of course, much smaller than if the boat